The Secretary, on the part of the Rev. CharlesVignoles, Vicar of Clonmacnoise, presented rubbings of three ornamented stones lately discovered at Clonmacnoise, one of which bears the inscription Oᵽ com 5añ.

The thanks of the Academy were voted to the donor.

MONDAY, JUNE 9, 1862.

The VERY REV. CHARLES GRAVES, D. D., President, in the Chair.

The Rev. Dr. Reeves read a paper concerning the "Identification of St. Molagga's Church of Lann Beachaire, in Fingall, with the Ecclesiastical Remains at Bremore, in the parish of Balrothery, a little north of Balbriggan, which bear the name of Lambeecher in the Liber Niger of the See of Dublin."

SIR WILLIAM R. HAMILTON, LL. D., read the following paper :—

ON A NEW AND GENERAL METHOD OF INVERTING A LINEAR AND QUA-TERNION FUNCTION OF A QUATERNION.

Let a, b, c, d, e represent any five quaternions, and let the following notations be admitted, at least as temporary ones :—

$$ab - ba = [ab]; \; S[ab]c = (abc);$$
$$(abc) + [cb]Sa + [ac]Sb + [ba]Sc = [abc];$$
$$Sa[bcd] = (abcd);$$

then it is easily seen that

$$[ab] = -[ba]; \; (abc) = -(bac) = (bca) = \&c.;$$
$$[abc] = -[bac] = [bca] = \&c.;$$
$$(abcd) = -(bacd) = (bcad) = \&c.;$$
$$0 = [aa] = (aac) = [aac] = (aacd), \&c.$$

We have then these two Lemmas respecting Quaternions, which answer to two of the most continually occurring transformations of vector expressions :—

I. . . $0 = a(bcde) + b(cdea) + c(deab) + d(eabc) + e(abcd)$,

or I'. . . $e(abcd) = a(ebcd) + b(aecd) + c(abed) + d(abce)$;

and II. . . $e(abcd) = [bcd]Sae - [cda]Sbe + [dab]Sce - [abc]Sde$;

as may be proved in various ways.

Assuming therefore *any four* quaternions a, b, c, d, which are *not* connected by the relation,

$$(abcd) = 0,$$

we can *deduce* from them four others, a', b', c', d', by the expressions,

$$a'(abcd) = f[bcd], \quad b'[abcd] = -f[cda], \ \&c.,$$

where f is used as the characteristic of a linear or *distributive quaternion function* of a quaternion, of which the form is supposed to be given; and thus the *general form* of *such* a function comes to be represented by the expression,

$$V. . . \ r = fq = a'Saq + b'Sbq + c'Scq + d'Sdq;$$

involving *sixteen scalar constants*, namely those contained in $a'b'c'd'$.

The *Problem* is to *invert* this *function* f; and the *solution* of that problem is easily found, with the help of the new Lemmas I. and II., to be the following :—

$$VI. . . \ q(abcd)(a'b'c'd') = (abcd)(a'b'c'd')f^{-1}r = [bcd](rb'c'd')$$
$$+ [cda](rc'd'a') + [dab](rd'a'b') + [abc](ra'b'c');$$

of which solution the correctness can be verified, *à posteriori*, with the help of the same Lemmas.

Although the foregoing problem of *Inversion* had been *virtually* resolved by Sir W. R. H. many years ago, through a reduction of it to the corresponding problem respecting *vectors*, yet he hopes that, as regards the Calculus of *Quaternions*, the new solution will be considered to be an important step. He is, however, in possession of a general *method* for treating questions of this class, on which he may perhaps offer some remarks at the next meeting of the Academy.

The Secretary announced the following donations to the Museum :—

1. A medal struck in honour of Frederic Thiersch : presented by the Royal Academy of Sciences of Bavaria.

2. A commemorative medal : presented by the Royal Society of Christiania, Norway.

3. A stone ball and collar, found in a limestone gravel pit : presented by Hugh Blackney, Esq., Ballyellen, Goresbridge. The stone ball weighs about six ounces, and measures six inches in circumference, is slighly oval, and fits the collar exactly.

4. A small cannon-ball, weighing 2 lb. 14 oz., found on the battlefield of Aughrim : presented by Dr. Bigger.

5. A portion of a very flat stone " celt " found in a turf bog at Connemara : presented by Dr. Mac Swiney, Stephen's-green. The celt is of peculiar interest, as it retains on the weathered surfaces of its cutting edge the scratches or marks of the fine sand with which it appears to have been sharpened shortly before it was lost.

6. A specimen of yellow tile, or brick, from the foundation of a building at the corner of Grafton-street and Nassau-street, described in Mr. Mallet's note accompanying the donation.

7. A peculiarly shaped stone celt, and a leaden cross, found at Newry : presented by P. Brophy Esq., Dawson-street.

8. A number of copper coins: presented by Mr. James Murphy, Lombard-street.

9. Three tradesman's tokens, viz :—MacAvragh, of Belfast; Wilson, of Dublin ; and Nicholls, of Maryborough ; all found at the latter place : presented by the Rev John O'Hanlon, C. C., of Dublin.

10. A piece of a modern sword-blade ; a very beautiful V-shaped flint arrow-head ; and the under and two upper stones of one of those primitive hand-mills called grain-rubbers in Dr. Wilde's Catalogue, Part I., p. 104. The under stone has its loop on its side, and not on its back, which is usual in perfect specimens of this kind : presented by Colonel Edwards, of Fintona.

James O'Reilly, Esq., exhibited the following from the collection of J. Summers, Esq. :—1. A copper blade, of the scythe shape ; length about $12\frac{3}{4}$ inches—Mr. O'Reilly cannot say where it was found originally ; 2. A small brass or bronze spur, said to have been found at Dunshaughlin ; 3. A steel or iron arrow-head; 4. One of several cinerary urns found on Tallaght Hill.

The thanks of the Academy were voted to the donors and exhibitor.

MONDAY, JUNE 23, 1862.

The VERY REV. CHARLES GRAVES, D. D., President, in the Chair.

ON the recommendation of the Council, it was

RESOLVED,—To authorize the Treasurer to sell out so much of the Cunningham Fund Stock as will produce £61 4s. 4d., to pay the difference between the cost of the four Cunningham Medals lately awarded, and the half-year's interest on the Stock, now due : the amount to be sold out being part of the amount of Interest added to the Capital Stock since the former award of Medals in 1858.

The Rev. Dr. LLOYD read a paper—

ON THE PROBABLE CAUSES OF THE EARTH-CURRENTS.

IN a former communication to the Academy, I endeavoured to prove that the diurnal changes of the horizontal needle were the result of electric currents traversing the earth's crust. The existence and continuous flow of such currents had been established, as I believe, by the observations of Mr. Barlow, made on two of the telegraphic lines of England ; and it only remained to show that their laws corresponded with those of the magnetic changes. This part of the solution of the problem has, I venture to think, been given in the paper above referred to.